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For: A TOUCH PANEL WITH AN INTEGRAL WIRING HARNESS

- 1 1. A method of manufacturing a touch screen panel, the method comprising:
- 2 coating an insulative substrate with a resistive layer;
- 3 depositing a dielectric border layer on the periphery of the resistive
- 4 layer; and
- 5 applying a pattern of conductive edge electrodes to the resistive
- 6 layer and applying a conductive wire trace pattern to the dielectric border layer to
- 7 electrically isolate the wire trace pattern from the edge electrodes.
- 1 2. The method of claim 1 in which the resistive layer is a tin oxide
- 2 composition.
- 1 3. The method of claim 1 in which the insulative substrate is glass.
- 1 4. The method of claim 1 in which the step of depositing the dielectric border
- 2 layer includes screen printing a lead borosilicate glass composition on the periphery of
- 3 the resistive layer.
- 1 5. The method of claim 1 in which the step of applying the pattern of
- 2 conductive edge electrodes to the resistive layer and the step of applying the conductive
- 3 wire trace pattern to the dielectric border layer includes screen printing silver/frit paste on
- 4 the resistive layer to form the edge electrode pattern and simultaneously screen printing a
- 5 silver/frit paste on the dielectric border layer to form the wire trace pattern.

1 6. The method of claim 1 further including the step of applying a protective
2 border layer over the edge electrodes and the wire traces.

1 7. The method of claim 6 in which the step of applying the protective border
2 layer includes screen printing an insulative composition over the edge electrodes and the
3 wire traces.

1 8. The method of claim 7 in which the insulative composition is a lead
2 borosilicate glass composition.

1 9. The method of claim 6 further including the step of firing the applied edge
2 electrodes, the wire traces, the dielectric border layer, and the protective border layer.

1 10. The method of claim 9 in which firing includes subjecting the panel to an
2 elevated temperature in a first period of time to burn off any organic material and a dwell
3 period at the elevated temperature to cure the electrodes and wire trace materials and to
4 fuse the border layer materials.

1 11. The method of claim 10 in which the elevated temperature is between
2 500°C-525°C, the first time period is approximately 5 minutes and the dwell period is
3 approximately 2-3 minutes.

1 12. A touch screen panel comprising:
2 a substrate with a resistive layer deposited on one surface thereof;
3 a dielectric border layer on the periphery of the resistive layer;
4 a conductive wire trace pattern on the dielectric border layer; and
5 a pattern of conductive edge electrodes on the resistive layer.

1 13. The touch screen panel of claim 12 in which the resistive layer is a tin
2 oxide composition.

1 14. The touch screen panel of claim 12 in which the substrate is glass.

1 15. The touch screen panel of claim 12 in which the dielectric border layer is
2 formed from a lead borosilicate glass composition.

1 16. The touch screen panel of claim 12 in which the conductive wire trace
2 pattern is formed from a silver/frit paste composition.

1 17. The touch screen panel of claim 12 in which the pattern of conductive
2 edge electrodes are formed from a silver/frit paste composition.

1 18. The touch screen panel of claim 12 further including a protective border
2 layer over the edge electrodes and the wire traces.

- 1 19. The touch screen panel of claim 18 in which the protective border layer is
2 formed from a lead borosilicate glass composition.

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1 20. A method of manufacturing a touch screen panel, the method comprising:
2 coating a substrate with a resistive layer;
3 applying a pattern of conductive edge electrodes to the resistive
4 layer;
5 depositing a dielectric border layer over the conductive edge
6 electrodes; and
7 applying a wire trace pattern on the dielectric border layer.

1 21. The method of claim 20 in which the resistive layer is a tin oxide
2 composition.

1 22. The method of claim 20 in which the substrate is glass.

1 23. The method of claim 20 in which the step of depositing the dielectric
2 border layer over the conductive edge electrodes includes screen printing a lead
3 borosilicate glass composition on the periphery of the touch screen panel over the
4 conductive edge electrodes.

1 24. The method of claim 20 in which the step of applying the pattern of
2 conductive edge electrodes includes screen printing silver/frit paste on the resistive layer
3 to form the edge electrode pattern.

1 25. The method of claim 20 in which the step of applying a wire trace pattern
2 includes screen printing silver/frit paste on the dielectric border layer to form the wire
3 trace pattern thereon.

1 26. The method of claim 20 further including the step applying a protective
2 border layer over the wire trace pattern and the dielectric border layer.

1 27. The method of claim 26 in which the step of applying the protective
2 border layer includes screen printing an insulative composition over the wire trace pattern
3 and the dielectric border layer.

1 28. The method of claim 27 in which the insulative composition is a lead
2 borosilicate glass composition.

1 29. The method of claim 27 further including the step of firing the applied
2 edge electrodes, the wire traces, the dielectric border layer, and the border layer.

1 30. The method of claim 20 in which firing includes subjecting the panel to an
2 elevated temperature in a first period of time to burn off any organic material and a dwell
3 period at the elevated temperature to cure the electrodes and wire trace materials and to
4 fuse the border layer materials.

- 1 31. The method of claim 30 in which the elevated temperature is between
2 500°C-525°C, the first time period is approximately 5 minutes and the dwell period is
3 approximately 2-3 minutes.

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1 32. A touch panel comprising:
2 a substrate with a resistive layer deposited on one surface thereof;
3 a pattern of conductive edge electrodes on the resistive layer;
4 a dielectric border layer over the pattern of conductive edge
5 electrodes; and
6 a wire trace pattern on the dielectric border layer.

1 33. The touch panel of claim 32 in which the resistive layer is a tin oxide
2 composition.

1 34. The touch screen panel of claim 32 in which the substrate is glass.

1 35. The touch screen panel of claim 32 in which the dielectric border layer is
2 formed from a lead borosilicate glass composition.

1 36. The touch screen panel of claim 32 in which the conductive wire trace
2 pattern is formed from a silver/frit paste composition.

1 37. The touch screen panel of claim 32 in which the pattern of conductive
2 edge electrodes are formed from a silver/frit composition.

1 38. The touch screen panel of claim 32 further including a protective border
2 layer over the edge electrodes and the wire traces.

1 39. The touch screen panel of claim 38 in which the protective border layer is
2 formed from a lead borosilicate glass composition.

1 40. A method of manufacturing a touch screen panel, the method comprising:
2 coating an insulative substrate with a resistive layer;
3 depositing a dielectric border layer on the periphery of the resistive
4 layer;
5 applying a pattern of conductive edge electrodes to the resistive
6 layer and applying a conductive wire trace pattern to the dielectric border layer to
7 electrically isolate the wire trace pattern from the electrodes;
8 depositing a protective border layer over the edge electrodes and
9 the wire traces to protect them; and
10 co-firing the wire trace pattern, the edge electrodes, the dielectric
11 border layer, and the protective layer all at the same time.

- 1 41. A method of manufacturing a touch screen panel, the method comprising:
2 coating a substrate with a resistive layer;
3 applying a pattern of conductive edge electrodes to the resistive layer;
4 depositing a dielectric border layer over the conductive edge electrodes;
5 applying a wire trace pattern on the dielectric border layer;
6 applying a protective border layer over the wire trace pattern; and
7 co-firing the wire trace pattern, the edge electrodes, the dielectric border
8 layer, and the protective border layer all at the same time.